Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL QUALITY MEASURES CLEARINGHOUSE

General

Title

Pediatric asthma: percentage of children, ages 1 through 17 years with persistent asthma, who, during the measurement year, presented to a hospital emergency department (ED) for an asthma exacerbation and were prescribed an inhaled corticosteroid (ICS) at the time of discharge.

Source(s)

Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC). Basic measure information: inhaled corticosteroid for children with persistent asthma prescribed at time of discharge from the emergency department. Ann Arbor (MI): Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC); 2016 May. 42 p.

Measure Domain

Primary Measure Domain

Clinical Quality Measures: Process

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure is used to assess the percentage of children, ages 1 through 17 years with persistent asthma, who, during the measurement year, presented to a hospital emergency department (ED) for an asthma exacerbation and were prescribed an inhaled corticosteroid (ICS) at the time of discharge.

A higher proportion indicates better performance, as reflected by children with persistent asthma being prescribed an appropriate medication. Children with persistent asthma are restricted to those who meet at least one of the following criteria during both the measurement year and the year prior: at least one ED visit with a principal diagnosis of asthma; at least one acute inpatient encounter with a principal diagnosis of asthma; at least three outpatient visits with an asthma diagnosis on different dates; or at least four asthma medication dispensing events. Criteria need not be the same across both years.

Rationale

Asthma is a chronic respiratory disease characterized by exacerbations that lead to symptoms of coughing, wheezing, and difficulties breathing. Pediatric asthma is the most common chronic disease of childhood and is on the rise, with over 7 million American children currently living with asthma (National Asthma Education and Prevention Program, 2007; Bloom, Cohen, & Freeman, 2012). Asthma is also a leading cause of hospitalization for children (Pedersen et al., 2011), responsible for approximately $56 billion in medical costs, lost days from school and work, and early deaths in the United States (Centers for Disease Control and Prevention [CDC], 2011).

Clinical practice guidelines for asthma have been developed to direct providers to evidence-based medications and care to improve the quality of care for patients with asthma, while decreasing morbidity and mortality. Inhaled corticosteroids (ICS) are the gold-standard of asthma care and have been shown to reduce the number of asthma exacerbations and decrease acute care visits for asthma (Andrews, Teufel, & Basco, 2012). Regularly scheduled medical visits to evaluate asthma control and check medication adherence and device technique are recommended, as underlying asthma can change over time and treatment needs to be adjusted accordingly (National Asthma Education and Prevention Program, 2007). However, many children receive care on an episodic basis in their local emergency department (ED), rather than at regular outpatient visits. Primary care providers infrequently add controller medication (e.g., an ICS) after an ED visit (Schuh et al., 2012).

And even when providers do prescribe ICS, only 65% of patients subsequently filled their prescriptions at a pharmacy (Lehman et al., 2006). In a study by Andrews et al. (2012), children with asthma and an ED visit also demonstrated low rates of corticosteroid use and outpatient follow-up.

These findings, paired with the difficulties that minority populations have accessing primary care (Singer et al., 2005), highlight the opportunity emergency physicians have to prescribe ICS in the ED to improve asthma management for all children, and especially those at highest risk (Self et al., 2009).

Evidence for Rationale

Andrews AL, Teufel RJ 2nd, Basco WT Jr. Low rates of controller medication initiation and outpatient follow-up after emergency department visits for asthma. J Pediatr. 2012 Feb;160(2):325-30. PubMed

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Primary Health Components

Asthma; inhaled corticosteroids; children

Denominator Description

The denominator is the number of children, ages 1 through 17 years with persistent asthma, who, during the measurement year, presented to a hospital emergency department (ED) for an asthma exacerbation (see the related "Denominator Inclusions/Exclusions" field).

Numerator Description

The numerator is the number of children, ages 1 through 17 years with persistent asthma, who, during the measurement year, presented to a hospital emergency department (ED) for an asthma exacerbation and were prescribed an inhaled corticosteroid (ICS) at the time of discharge (see the related "Numerator Inclusions/Exclusions" field).

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

A clinical practice guideline or other peer-reviewed synthesis of the clinical research evidence

A formal consensus procedure, involving experts in relevant clinical, methodological, public health and organizational sciences

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

Pediatric Asthma Disease Prevalence and Incidence
Pediatric asthma is the most common chronic disease of childhood and is the leading cause of childhood school absences, emergency department (ED) visits, and hospitalizations due to chronic illness (Pedersen et al., 2011). The prevalence of pediatric asthma is increasing, with approximately 7 million American children under age 18 years currently living with asthma (Bloom, Cohen, & Freeman, 2012). Of these 7

million children, 4.1 million have suffered from an asthma attack in the previous 12 months (Centers for Disease Control and Prevention [CDC], National Center for Health Statistics [NCHS], 2011).

Pediatric Asthma Pathology and Severity

Asthma is a chronic disease of the small airways characterized by inflammation and airway hyper-responsiveness, which together lead to bronchoconstriction and mucus plugging (Pedersen et al., 2011). Symptoms of asthma include recurring episodes of wheezing, shortness of breath, chest tightness, and coughing. These episodes, or exacerbations, are typically associated with at least partially reversible airflow obstruction (National Asthma Education and Prevention Program, 2007) and may range in severity from mild to life-threatening (CDC, 2013). The causes of asthma are not fully understood (National Asthma Education and Prevention Program, 2007), but it is thought that multiple host and environmental factors may be involved at critical times in immune development (CDC, 2013). Environmental factors that are common triggers include respiratory viral infections; airborne allergens such as pollens, mold, animal dander, and dust mites; and air pollution, including tobacco smoke. There is no cure for asthma, but it can be controlled with appropriate medical care, medications, and avoidance of triggers (National Asthma Education and Prevention Program, 2007).

Pediatric Asthma Burden in Daily Life

The burden of pediatric asthma on children and families is significant. In 2008 the disease resulted in 14 million missed school days and an estimated $3.8 billion in lost productivity (CDC, 2013). Poorly controlled asthma can affect children's quality of sleep, school performance, and ability to participate in sports and social activities. Asthma deaths are rare, particularly among children and young adults, with the majority of deaths due to asthma occurring in persons aged 65 years and older. However, children do die from asthma. The CDC has reported that in 2011, 169 children under 15 years of age died from the disease (CDC, 2014). Asthma deaths are thought to be largely preventable through appropriate care and management.

Pediatric Asthma Disease Cost

Pediatric asthma is one of the most common causes of preventable hospitalization (Kenyon et al., 2015). Although only a small percentage of the nearly 7 million United States (U.S.) children with asthma are admitted to the hospital in a given year, asthma is the third leading cause of child hospitalization and accounts for nearly one-third of national pediatric asthma costs (Kenyon et al., 2014). Pediatric patients with asthma are seen across the health care spectrum. They account for almost 5 million physician visits (Akinbami & CDC NCHS, 2006), and their average annual prescription drug expenditures have nearly doubled since the 1990s (Sarpong, 2011).

Outcomes of Inhaled Corticosteroids Prescribed in the Emergency Department

Asthma is a chronic disease that cannot be cured, but it can be controlled through appropriate management (van der Molen et al., 2006). Inhaled corticosteroids (ICS) are considered the gold standard for the treatment of persistent asthma and are associated with a significant protective effect against future hospitalizations and ED visits (Adams et al., 2001). Despite the well-established efficacy of ICS, these anti-inflammatory medications are often under-used. Non-adherence in children and adolescents is particularly high, leading to poor asthma control and subsequent decreased quality of life, increased health care utilization, and even risk of death (Desai & Oppenheimer, 2011). Pediatric asthma patients seen in the ED are at high risk for future exacerbations, making it important that they receive appropriate preventive care (Andrews, Teufel, & Basco, 2012). Initiating maintenance ICS in the ED, at the time of an acute exacerbation, is one important strategy to increase ICS coverage and decrease risk of future exacerbations for pediatric asthma patients.

Asthma is the third leading cause of hospitalization in children under the age of 15 years and is associated with increased frequency of ED visits (Pearson et al., 2014). The appropriate use of controller medications has been shown to reduce asthma exacerbations and related acute care visits for asthma (Andrews, Teufel, & Basco, 2012). However, under-utilization of controller medications is common. An analysis of an integrated managed care database found that asthma patients seen in the ED were more dependent on rescue medications, such as short-acting beta-agonists and oral corticosteroids, than on long-term controllers, such as inhaled corticosteroids, in the month prior to the ED visit (Ornato, 2007).

Garro et al. (2011) found ample opportunity (over 2.2 million asthma-related visits in the two year study period, from 2005 to 2007 at U.S. EDs), to prescribe an ICS in this setting. Yet Andrews et al. (2012) demonstrated that less than 20% of patients seen in the ED for asthma had filled a prescription for a controller medication in the month of or the month after the urgent visit, and only 12% had followed up with their primary care provider. Another study by Andrews and colleagues (2014) showed that prescribing or dispensing ICS at the time of discharge from the ED led to fewer return visits to the ED and fewer hospitalizations in the subsequent 30-day period. Experts have urged that standards of care should change in order to reflect evidence and international guidelines regarding initiation of ICS maintenance therapy (Self et al., 2009).

As mentioned, both national and international asthma guidelines support the initiation of ICS prior to discharge from the ED. The National Asthma Education and Prevention Program's *Expert Panel Report-3: Guideline for the Diagnosis and Management of Asthma* (2007) supports the practice of prescribing ICS at all levels of care and notes that initiating ICS at discharge from the ED (for example, providing a 1 to 2 month supply) should be considered for many reasons: the potential for ICS to reduce subsequent ED visits, the clear evidence that long-term-control ICS therapy reduces exacerbations in patients with persistent asthma, and the opinion of the Expert Panel that initiation and continuation of ICS therapy at ED discharge can be an important effort to bridge the gap between emergency and primary care for asthma (National Asthma Education and Prevention Program, 2007). The Global Initiative for Asthma (GINA) (2014) likewise recommends that the majority of patients should be prescribed regular ongoing ICS treatment at discharge, given that the occurrence of a severe exacerbation is a risk factor for future exacerbation and that ICS medications significantly reduce the risk of asthma-related death or hospitalization.

This measure assesses the percentage of children, ages 1 year through 17 years with persistent asthma, who, during the measurement year, presented to a hospital ED for an asthma exacerbation and were prescribed an ICS at the time of discharge. A higher proportion indicates better performance, as reflected by children with persistent asthma being prescribed an appropriate medication. The measure does not change across developmental stages.

Performance Gap
ICS are considered the best treatment for persistent asthma and are associated with a significant protective effect against future hospitalizations and ED visits (Adams et al., 2001). However, most children with asthma presenting to the ED have poorly controlled asthma (Singer et al., 2005), and only 4% of children with asthma discharged from the ED with persistent asthma were prescribed ICS at discharge (Garro et al., 2011).

Warman et al. (2001) found that only 35% of children who had been hospitalized with asthma were receiving ICS, and Lehman et al. (2006) reported that only 65% of patients with an ICS prescription from their primary care provider filled that prescription at their pharmacy. These statistics, paired with the difficulties many minority populations face accessing primary care (Singer et al., 2005), highlight the current gap in care for children with asthma. Prescribing or dispensing an ICS at ED discharge to all children with persistent asthma who present with an asthma exacerbation would help decrease the number of children with poorly controlled asthma. This, in turn, would decrease the number of costly ED visits.

There currently is no quality measure assessing the rate at which ICS are prescribed at ED discharge for children, ages 1 through 17 years with persistent asthma, who presented with an asthma exacerbation. This measure, in providing an accurate assessment of dispensing and prescribing rates, would be a first step in filling this gap. Providing appropriate anti-inflammatory medications to children with persistent asthma is likely to improve patient outcomes by reducing the frequency of urgent care and ED visits and the number of hospitalizations, while improving perceived quality of life.

Evidence for Additional Information Supporting Need for the Measure

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Extent of Measure Testing

Reliability

Medical Record Abstraction. Medical record data were obtained through HealthCore, Inc. for the measurement year of 2013. HealthCore is an independent subsidiary of Anthem, Inc., the largest health benefits company/insurer in the United States. HealthCore owns and operates the HealthCore Integrated Research Database (HIRD), a longitudinal database of medical and pharmacy claims and enrollment information for members from 14 geographically diverse Blue Cross and/or Blue Shield health plans in the Northeast, South, West and Central regions of the United States, with members living in all 50 states. In total, the HIRD includes approximately 60 million insured individuals between January 2006 and June 2014.

Approximately 205,000 children, ages 0 through 17 years old, with an asthma diagnosis/symptoms were identified in the HIRD in 2012 (the year prior to the measurement year, per measure specification). Of these, a cohort of 10,156 (5.0%) children meeting criteria for persistent asthma was identified. Among this set of children, 376 (3.7%) presented to a hospital emergency department (ED) for an asthma exacerbation during the measurement year and met inclusion/exclusion criteria (e.g., had no evidence of current inhaled corticosteroid [ICS] or daily controller medication use) for this measure. A stratified random sample of charts was requested from provider offices and health care facilities, with a target of

obtaining at least 135 completed records.

Patient medical records were sent to a centralized location for data abstraction. Trained medical record abstractors collected and entered information from paper copies of both electronic and paper medical records into a password-protected database. To help ensure consistency of data collection, the medical record abstractors were trained on the study's design and presented with a standardized data collection form developed to minimize the need for abstractors to make subjective judgments during the abstraction process. In addition, data entered onto a scanner form and subsequently scanned was reviewed through a series of quality checks.

In total, 160 charts were reviewed and met all inclusion/exclusion criteria. Nine children (5.6%) were excluded, as they turned 18 years old within the measurement year, resulting in a final denominator of 151 (94.4%). Chart review indicated that among these 151 children with persistent asthma who presented to the ED for an asthma exacerbation, 14 (9.3%) were prescribed an ICS at the time of discharge.

Inter-Rater Reliability (IRR). Reliability of medical record data was determined through re-abstraction of patient record data to calculate the IRR between abstractors. Broadly, IRR is the extent to which the abstracted information is collected in a consistent manner. Low IRR may be a sign of poorly executed abstraction procedures, such as ambiguous wording in the data collection tool, inadequate abstractor training, or abstractor fatigue. IRR was determined by calculating percent agreement. Any differences were remedied by review of the chart. IRR was determined by calculating both percent agreement and Cohen's kappa statistic.

IRR Results. Of the 160 records abstracted for this measure, 7 (4%) were reviewed for the IRR. IRR was assessed by comparing abstractor agreement with a senior abstractor on data elements that could be abstracted for this measure. Overall, abstractor agreement was 100%; the kappa statistic was 1.0, indicating that a perfect level of IRR was achieved. Given this evidence, the data elements needed for calculation of the measure can be abstracted from medical records with a high degree of accuracy.

Validity

The validity of this measure was determined from two perspectives: face validity and validity of the medical record data.

Face Validity. Face validity is the degree to which the measure construct characterizes the concept being assessed. The face validity of this measure was established by a national panel of experts and parent representatives for families of children with asthma convened by Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC). The Q-METRIC expert panel included nationally recognized experts in asthma, representing the areas of general pediatrics, family practice, pediatric pulmonology, allergy, pediatric hospitalist, asthma education (including certified asthma educators), and general and pediatric emergency medicine. In addition, measure validity was considered by experts in state Medicaid program operations, health plan quality measurement, health informatics, and health care quality measurement. In total, the Q-METRIC Asthma panel included 16 experts, providing a comprehensive perspective on asthma care and the measurement of quality metrics for states and health plans.

The Q-METRIC expert panel concluded that this measure has a high degree of face validity through a detailed review of concepts and metrics considered to be essential to effective asthma management and treatment. Concepts and draft measures were rated by this group for their relative importance. This measure was highly rated, receiving an average score of 7.1 (with 9 as the highest possible score).

The Importance of Abstracted Medical Record Data. This measure is specified using medical record data after administrative claims were used to identify the eligible population. Medical records are considered the gold standard for clinical information; our findings indicate that these data have a high degree of face validity and reliability, as summarized above. As the prescription of an ISC upon discharge from the ED cannot be identified using claims, it is necessary to identify this criterion within medical records in order to accurately assess this measure. As a consequence, implementing this measure solely upon

administrative claims data would not be possible, and abstraction of medical records is necessary.

Evidence for Extent of Measure Testing

Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC). Basic measure information: inhaled corticosteroid for children with persistent asthma prescribed at time of discharge from the emergency department. Ann Arbor (MI): Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC); 2016 May. 42 p.

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Emergency Department

Hospital Outpatient

Managed Care Plans

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Single Health Care Delivery or Public Health Organizations

Statement of Acceptable Minimum Sample Size

Specified

Target Population Age

Age 1 to 17 years

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Aim

Better Care

National Quality Strategy Priority

Prevention and Treatment of Leading Causes of Mortality

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Data Collection for the Measure

Case Finding Period

The measurement year

Denominator Sampling Frame

Enrollees or beneficiaries

Denominator (Index) Event or Characteristic

Clinical Condition

Diagnostic Evaluation

Encounter

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions
The denominator is the number of children, ages 1 through 17 years with persistent asthma, who, during the measurement year, presented to a hospital emergency department (ED)* for an asthma exacerbation. The eligible population includes children who are 1 year or older on January 1 of the measurement year but younger than 18 years on December 31 of that year. Children must be continuously enrolled in their insurance plan during both the measurement year and the year prior.

Children with persistent asthma are restricted to those who meet at least one of the following criteria during both the measurement year and the year prior to the measurement year. Criteria are drawn from the Healthcare Effectiveness Data and Information Set and need not be the same across both years. Refer to Tables 1 and 2 of the original measure documentation for codes to identify visit type and diagnosis of persistent asthma.

- At least one ED visit with a principal diagnosis of asthma
- At least one acute inpatient encounter with a principal diagnosis of asthma
- At least three outpatient visits with an asthma diagnosis on different dates
- At least four asthma medication dispensing events (refer to *Appendix 1 – Asthma Drug and Device List* in the original measure documentation)

*ED visits were defined using Current Procedural Terminology (CPT) and Revenue Codes (refer to Table 1 in the original measure documentation); ED visits related to asthma were defined as an ED visit with at least one asthma diagnosis related to such visit (refer to Table 2 of the original measure documentation).

Exclusions

- Children with claims-based evidence of current inhaled corticosteroid (ICS) use (refer to *Appendix 2 – Inhaled Corticosteroids* in the original measure documentation)
- Children with claims-based evidence of current controller medication use (refer to *Appendix 3 – Controller Medications* in the original measure documentation)
- Children in the ED who are admitted to the hospital
- Children with a diagnosis during the measurement year or the year prior to the measurement year indicating cystic fibrosis or bronchiectasis (refer to Table 3 of the original measure documentation for codes to identify exclusions)
- Children younger than 6 years with a diagnosis during the measurement year or the year prior to the measurement year indicating bronchopulmonary dysplasia, tracheomalacia, or bronchomalacia (refer to Table 3 of the original measure documentation to identify exclusions)
- Children 6 years or older with a diagnosis during the measurement year or the year prior to the measurement year indicating bronchopulmonary dysplasia, tracheomalacia, or bronchomalacia (refer to Table 3 of the original measure documentation to identify exclusions), *unless* there is also a diagnosis for persistent asthma (refer to Table 2 of the original measure documentation to identify exclusions)
- Children with a diagnosis indicating "exercise induced bronchospasm" (International Classification of Diseases, Ninth Revision [ICD-9] code 493.81 in Table 3 of the original measure documentation), *unless* there is also a diagnosis for persistent asthma (refer to Table 2 of the original measure documentation to identify exclusions)

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions

The numerator is the number of children, ages 1 through 17 years with persistent asthma, who, during the measurement year, presented to a hospital emergency department (ED) for an asthma exacerbation and were prescribed an inhaled corticosteroid (ICS)* at the time of discharge.

*ICS are anti-inflammatory medications that help control inflammation in the bronchial tubes, which causes airway narrowing in asthma (refer to *Appendix 2 – Inhaled Corticosteroids* in the original measure documentation). Prescription of an ICS upon ED discharge was based upon medical record review.

Exclusions

Unspecified

Numerator Search Strategy

Encounter

Data Source

Administrative clinical data

Electronic health/medical record

Paper medical record

Type of Health State

Does not apply to this measure

Instruments Used and/or Associated with the Measure

Unspecified

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Rate/Proportion

Interpretation of Score

Desired value is a higher score

Allowance for Patient or Population Factors

not defined yet

Standard of Comparison

not defined yet

Identifying Information

Original Title

Inhaled corticosteroid for children with persistent asthma prescribed at time of discharge from the emergency department.

Measure Collection Name

Pediatric Asthma Measures

Submitter

Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC) - Academic Affiliated Research Institute

Developer

Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC) - Academic Affiliated Research Institute

Funding Source(s)

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Financial Disclosures/Other Potential Conflicts of Interest

Unspecified

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2016 May

Measure Maintenance

Unspecified

Date of Next Anticipated Revision

Unspecified

Measure Status

This is the current release of the measure.

Measure Availability

Source available from the Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC) Web site . Support documents also available from the Q-METRIC Web site .

For more information, contact Q-METRIC at 300 North Ingalls Street, Room 6C06, SPC 5456, Ann Arbor, MI 48109-5456; Phone: 734-232-0657.

NQMC Status

This NQMC summary was completed by ECRI Institute on June 23, 2016. The information was verified by the measure developer on June 28, 2016.

Copyright Statement

Production

Source(s)

Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC). Basic measure information: inhaled corticosteroid for children with persistent asthma prescribed at time of discharge from the emergency department. Ann Arbor (MI): Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC); 2016 May. 42 p.

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